Final Cancel G1

cooling the thin film to room temperature from the temperature within the supercooled liquid phase region to stop deforming the thin film and thereby forming the thin film-structure.

REMARKS

Claims 3-22 are pending. By this Amendment, claim 3 is amended. Reconsideration based on the above amendment and following remarks is respectfully requested.

The attached Appendix includes marked-up copies of each rewritten claim (37 C.F.R. §1.121(c)(1)(ii)).

Entry of the amendments is proper under 37 CFR §1.116 since the amendments: (a) place the application in condition for allowance (for the reasons discussed herein); (b) do not raise any new issue requiring further search and/or consideration (since the amendments amplify issues previously discussed throughout prosecution); (c) do not present any additional claims without canceling a corresponding number of finally rejected claims; and (d) place the application in better form for appeal, should an appeal be necessary. The amendments are necessary and were not earlier presented because they are made in response to arguments raised in the final rejection. Entry of the amendments is thus respectfully requested.

I. Claims 3-22 Define Patentable Subject Matter

A. The Office Action rejects claims 3-5 under 35 U.S.C. §103(a) as unpatentable over Saotome in view of Barsowm. This rejection is respectfully traversed.

The Office Action asserts that Saotome renders obvious the subject matter of claims 3-5. However, it is respectfully submitted that Saotome does not teach or suggest forming on a substrate a thin film made of an amorphous material film exhibiting a viscous flow within a viscosity range of 10^8 - 10^{13} Pa·S when heated at a temperature within a supercooled liquid phase region, heating the film to a temperature within the supercooled

liquid phase region so that the thin film has a viscous flow between 10^8-10^{13} Pa·S, deforming the thin film to a given shape without the use of an external force and cooling the thin film to room temperature from the temperature within the supercooled liquid phase region to stop deforming the thin film and thereby forming the thin film structure, as claimed in claim 3.

Instead, as discussed in the Remarks filed January 28, 2002 and April 12, 2002, Saotome discloses a method for micro-forming a material using a V-grooved die. As shown on page 344, col. 1, micro-forming is carried out with a specially developed apparatus that enables a load control from 300 to 100 MPa in a compression punch stress and a punch speed from about .001 to .1 mm per second. Thus, as one can see from this disclosure, contrary to the claimed invention, the material is deformed using the weight of the press.

In Saotome, the $La_{55}Al_{25}NI_{25}$ alloy member is deformed under a supercooled liquid condition by utilizing a large external force of 10 MPa, which corresponds to about 10 kgf/cm^2. That is, in Saotome, such a large external force is required to deform the $La_{55}Al_{25}NI_{25}$ alloy member, which is quite different from the claimed invention which does not require an external force to deform the member. Therefore, the $La_{55}Al_{25}NI_{25}$ alloy member cannot exhibit a viscosity flow within a viscosity of about 10^8 - 10^{13} Pa·S even though it is heated to a temperature within its supercooled liquid condition. In fact, the $La_{55}Al_{25}NI_{25}$ alloy member is not exemplified in the specification of the claimed invention.

The Office Action admits that Saotome does not expressly disclose a thin film exhibiting a viscous flow between 10^8 - 10^{13} Pa·S when heated at a temperature within the supercooled liquid phase region, and deforming the thin film to a given shape without the use of any external force. In fact, Saotome never mentions or measures the actual viscous flow of the thin film material.

The Office Action asserts that in the "Response to Arguments" that the actual viscous flow of the amorphous alloys can be determined and estimated from the figures provided by

Saotome. However, the Examiner does not disclose how this viscous flow can be determined and estimated from the figures provided. Additionally, Saotome does not disclose heating the thin film to a temperature within the supercooled liquid phase regions so that the thin film has a viscous flow between 10^8-10^{13} Pa·S, as recited in claim 3.

However, Saotome does not disclose the viscous flow of amorphous alloys to be within a range of 10^8-10^{13} Pa·S when heated at a temperature within a super cooled liquid phase region, as recited in claim 3. Further, Saotome does not disclose heating a thin film to a temperature within a supercooled liquid phase region so that the thin film has a viscous flow between 10^8-10^{13} Pa·S as recited in claim 3.

The Office Action asserts that Barsoum makes up for the deficiencies of Saotome by disclosing a range of viscosity for glass. Specifically, the Office Action asserts that any material that is glass or amorphous can be subjected to the micro-forming process and exhibits a viscosity range within 10^8 - 10^{13} Pa·S. However, Barsoum does not make up for the deficiencies of Saotome as discussed above. Therefore, this assertion is respectfully traversed.

Accordingly, withdrawal of the rejection of claims 3-5 under 35 U.S.C. §103(a) in view of Saotome is respectfully requested.

B. The Office Action rejects claims 6, 7 and 9-22 under 35 U.S.C. §103(a) as being unpatentable over Saotome in view of Barsoum and further in view of U.S. Patent 5,994,159 to Aksyuk. This rejection is respectfully traversed.

It is respectfully submitted that Aksyuk does not make up for the deficiencies discussed above with respect to Saotome in view of Barsoum.

Aksyuk teaches a method of fabricating a thin film structure for a micro-mechanical device in which the thin film beam 8 is deformed by an external mechanical force. However, Aksyuk does not teach a method wherein the method for producing a thin film structure

comprises forming on a substrate a thin film made of an amorphous material exhibiting a viscous flow within a viscosity range of 10^8 - 10^{13} Pa·S when heated at a temperature within a supercooled liquid phase region, as claimed in independent claim 3.

Accordingly, due to their dependency upon claim 3, claims 6, 7 and 9-22 should also be considered allowable. Withdrawal of the rejection of claims 6, 7 and 9-22 under 35 U.S.C. §103(a) as being unpatentable over Saotome in view of Barsoum and further in view of Aksyuk is respectfully requested.

C. The Office Action rejects claim 8 under 35 U.S.C. §103(a) as being unpatentable over Saotome in view of Barsoum and Aksyuk and further in view of European patent EP 0 762 167 to Tregilgas. This rejection is respectfully traversed.

Tregilgas teaches a method of producing a thin film structure by forming a beam 24 (see Fig. 3F) of an amorphous conductive material. See col. 1, lines 49-53. However, nowhere does Tregilgas discuss an amorphous material film exhibiting a viscous flow within a viscosity range of 10^8 - 10^{13} Pa·S. In fact, nowhere does Tregilgas discuss an amorphous material having a supercooled liquid phase region.

In view of the foregoing discussions, it is respectfully submitted that the combination of Saotome, Barsoum, Aksyuk and Tregilgas does not teach, suggest or disclose the subject matter of independent claim 3. Therefore, due to its indirect dependency upon claim 3, claim 8 is also allowable. Accordingly, withdrawal of the rejection of claim 8 under 35 U.S.C. §103(a) in view of Saotome, Aksyuk and Tregilgas is respectfully requested.

II. Conclusion

In view of the foregoing amendments and remarks, Applicants submit that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 3-22 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,

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JAO:HNS/cfr

Attachment:
Appendix

Date: **December 23, 2002**

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DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry;
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APPENDIX

Changes to Claims:

The following is a marked-up version of the amended claim 3:

3. (~~Three~~ Four Times Amended) A method for producing a thin film-structure comprising the steps of:

forming on a substrate a thin film made of an amorphous material film exhibiting a viscous flow within a range of 10^8 - 10^{13} Pa·S when heated at a temperature within a supercooled liquid phase region;

heating the thin film to a temperature within the supercooled liquid phase region so that the thin film has a viscous flow between 10^8-10^{13} Pa·S;

deforming the thin film to a given shape without the use of an external force; and

cooling the thin film to room temperature from the temperature within the supercooled liquid phase region to stop deforming the thin film and thereby forming the thin film-structure.